

ABSTRACT

A roller bit is provided having super-abrasive inserts on cutting portions to assure that the bit will maintain cutting efficiency. In the described exemplary bits, the axes of the roller cones are also offset by a significant or "high offset" amount from the central longitudinal axis of the bit, thereby providing for increased shearing and grinding action by the bit. The use of high offset in combination with super-abrasive inserts provides for optimal bit cutting designs which provide increases in ROP while preserving the bit's ability to hold gage and remain durable to achieve acceptable footage. Minimum high offsets and preferred high offsets are described for various bit sizes, designs and nomenclatures, including milled tooth bits and insert-type bits designed for use in soft-through-medium formation hardnesses as well as formations with greater hardnesses.